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SCIENCE NEWS-LETTER

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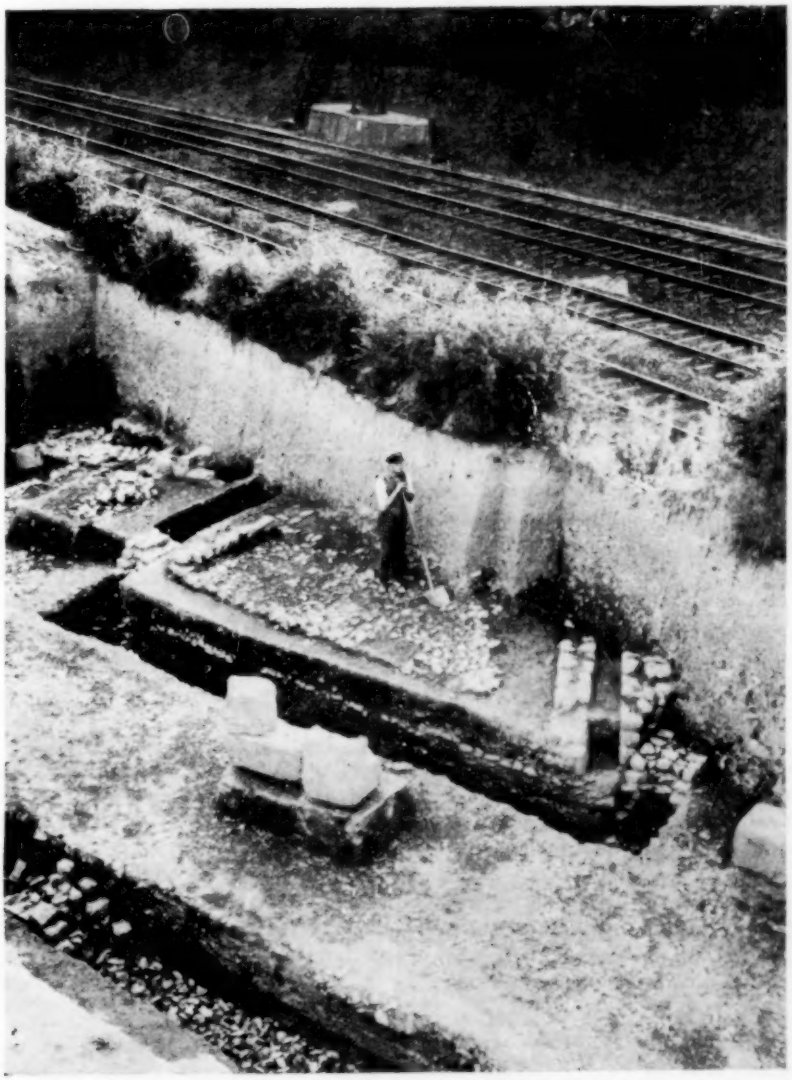

THE NEW AND THE OLD

Modern Railway and an Ancient Temple

(See page 367)

Vol. XV No. 427

Study Tests for Air in Gasoline

Metrology

When you stop at the filling station for five gallons of gas, are you getting all gasoline, or are you paying for part air?

The question of air dissolved in gasoline, and means of testing for its amount, was one of the problems to engage the attention of the twenty-second National Conference on Weights and Measures. It is this air in solution that makes the gas appear to boil when pumped into the glass chamber of the filling station pump, said Dr. Oscar C. Bridgeman, research associate at the Bureau of Standards for the Society of Automotive Engineers.

"When a gasoline direct from the stills at a refinery is exposed to the air on storage in a tank fitted with a vent hole, a considerable amount of air may go into solution," said Dr. Bridgeman. "This air in solution cannot be seen for it is so finely subdivided that it is invisible. If the gasoline warms up, some of the dissolved air will collect in the form of bubbles and rise to the surface, for the solubility of air decreases as the temperature increases. When a gasoline is stored under air pressure, more air will dissolve than when exposed to the atmosphere, for the solubility of air increases with the air pressure above the gasoline.

"Two methods can be used for the experimental determination of the solubility of air in gasolines. In the first method, a sample of the gasoline, previously exposed to the air, is analyzed and the amount of air in solution is measured. In this analysis the air in solution is pumped off into a graduated vessel by means of a vacuum pump while the gasoline is kept frozen with liquid air at a temperature of about minus 300 degrees Fahrenheit.

"In the other method, the gasoline is first freed from air and then known amounts of air are added. Measurements of the air pressure above the gasoline furnish enough information to calculate the solubility. Both of these methods have been used with a number of gasolines and it has been found that the solubility of air varies somewhat with the gravity of the gasoline.

"A volatile aviation gasoline exposed to the atmosphere will dissolve about one-quarter of its own volume of air, whereas a U. S. Motor gasoline will dissolve about one-sixth of its volume of air at ordinary temperatures. The change of solubility with temperature is not very large, but a doubling of the air pressure above the gasoline will approximately double the solubility.

"When the air is actually in solution in a gasoline, the volume occupied by the gasoline is not appreciably different from what it would be if there were no dissolved air in it. However, if the gasoline is saturated with air under pressure and this pressure is released, the air may form fine bubbles in the gasoline and the volume may be much larger due to these bubbles displacing some of the liquid. Hence the precise metering of gasoline must be done under such conditions that no bubbles of air are present while the liquid is passing through the meter.

"Another practical phase of the problem of dissolved air in gasoline lies in its application to the pumping of gasolines by suction lift. The height to which it is feasible to pump gasoline under these conditions is dependent not only upon the volatility of the gasoline but also upon the amount of air in solution."

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Lamb's Liver Anemia Cure

Medicine

Calf's liver may be a more epicurean dish, but the liver of any other domestic animal may prove as efficient in curing anemia, chemists and nutritionists declare. Young lamb's liver, judged by the amount of minerals it contains, may have a vitamin content and anemia-curing power equal to, if not superior to that of calf's liver. Investigations show considerable variation in the mineral and nitrogen content of the livers of calves, oxen, lambs, hogs, colts, chickens and rats, Prof J. S. McHargue, W. R. Roy and F. E. Hull, of the Kentucky Experiment Station, reported to the American Chemical Society. Whether livers from these various animals can make as great an appeal to the palate as that from calves is still an open question, to be solved, perhaps, by cooks.

Science News-Letter, June 15, 1929

Lightning Rod Wins

Engineering

In the only competition known in which the utility of the elevator was weighed against that of the lightning rod, the lightning rod came out on top, according to early records of the American Philosophical Society, oldest learned society in the United States.

These records show that in 1792 two papers were submitted in competition for the Magellanic premium. One was entitled, "A New Piece of Mechanism, Called the Elevator, Designed Principally for Lifting to Great Inaccessible Heights." The other described "The Improvement of Electrical Rods, or Lightning Conductors, by Pointing Them with Black Lead."

Strange as it may seem in the light of the present day status of the two devices, the paper on the lightning rod won that year's premium. But the elevator was not to stay down for long. Two years later the elevator paper was rewarded.

Science News-Letter, June 15, 1929

Near-sighted people have a tendency to write small; whereas far-sighted people write large.

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Roman Temples Unearthed in Germany

Anthropology

By Frank Thone

Sixty Roman temples to ancient German gods.

Such is the astonishing spoil turned up out of the earth by the spades of archaeologists in the old German city of Trier on the Moselle. It is the most striking find of its kind ever made north of the Alps, the largest group of Roman religious edifices known outside of Italy. Much still remains to be uncovered, buried under the debris of centuries, but enough has already been laid open to the light to add a long and important chapter to our knowledge of the life of the Romans, Germans and Gauls who thronged the streets of this "second Rome" over a millenium and a half ago.

Day by day the spades of the diggers go forward, but not fast enough to satisfy the scientific yearnings of Dr. Siegfried Loeschke, of the Provincial Museum of Trier. He has taken all the money he can get together—the heaviest contributor has been the Emergency Society for German Science—and hired men from the city's battalions of unemployed. But if one only could go ahead more rapidly. Perhaps some rich American. . . . The "reicher Amerikaner" of scholarly tastes figured largely in the endowment of archaeological and other scientific work abroad since the war; why not, then, in Trier? A restored temple could be dedicated as his monument—a distinction no man has had since the last of the pagan emperors of Rome!

But Doctor Loeschke is no man to waste time in dreaming. If *der reiche Amerikaner* turns up, why, fine; in the meantime, one goes on and digs up temples. And what a lot of temples there are, to what a variety of gods and goddesses! Over sixty structures, large and small, all massed together in the valley of a creek on the outskirts of the present city, with modernity running across one side in the shape of a railway cut, and crowding in on another under the guise of a leather goods factory; the place was a veritable town of temples.

Some of the gods are familiar enough: Jupiter, Mars, Mercury, and Apollo. Often the Roman deity will have another and unfamiliar name carved on the base of his altar or statue, identifying him with a Germanic deity who had the same attributes. Thus Apollo bears also the name of Grannus, worshipped by both Germans and Gauls as the god of healing. But many of the dedication-carvings are addressed to gods and goddesses not known in the Greco-Roman pantheon, and some of their names are disclosed here for the first time. Quite evidently the Romans of imperial days were very tolerant, and did not mind what gods the Treverans worshipped, or how, so long as the worshippers kept good order in public.

ONE OF THE SIXTY TEMPLES OF TRIER as it stood 1700 years ago, according to Dr. Loeschke. The architecture is German, not Roman.

A find of this kind in Trier was not wholly unexpected, although its wealth of archaeological treasure is really overwhelming. Trier was an important city in Roman times. It was, indeed, literally made by the Romans, for it was built and fortified by the Emperor Augustus before the beginning of the Christian era. Whether there was any native settlement there at all before the coming of the Roman is still doubtful; if there was, it must have been a mere village clustered about some primitive shrines in the valley where the temple city subsequently rose. But under the Caesars Trier increased in both size and importance, until for the space of a whole century it was the capital and administrative center for the provinces of Gaul, Spain and Britain. Roman writers referred to it as "the Rome beyond the Alps", and emperors built for it bridges, walls, gates, amphitheaters, vast baths, and at last, after Constantine, Christian basilicas. Some of these structures are in use to this day, and the ruins of the rest, even before the amazing temple-town dug up by Doctor Loeschke, have been the boast of all loyal burghers of Trier and the admiration of thousands of visitors. The new discoveries become the crown and climax of Trier's treasure of Roman ruins.

Trier's older glories have been known because many of them have been in continuous use ever since the Romans built them. Treveran traffic still crosses a bridge whose piers were built by order of Augustus; on Sundays hymns go up to God from within church walls that have stood for more than 1500 years. Trier's newly-discovered archaeological wonder was buried, lost and forgotten for centuries because at a critical period in the city's history the citizens and their leaders literally had no use for pagan temples. Doctor Loeschke has discovered convincing evidence that this town of temples came to a sudden end in the year 337 A. D. through the iconoclastic zeal of the powerful Christian bishop Maximinius, who would tolerate no "strange gods" before the god he served.

The ruin of the temples was, paradoxically, also their preservation. Their overthrown images and altars were buried in the fragments of their walls, piled deeper with the later dust of centuries. The spot, avoided as accursed by the Christians and shunned in fear by those who still had heathen hearts, remained vacant land for generation after generation. After the collapse of the Roman empire and the final triumph of the fierce Germanic tribe of Franks who conquered Gaul and gave it a new name, France, the importance of Trier declined and the center of its population shifted as well, so that the site of the once thickly-built temple town in the valley was still empty and unused ground until Dr. Loeschke began his excavations. The neglect of the past was its best gift to the present. (*Turn to next page*)

Roman Temples in Germany—*Continued*

Many and remarkable are the gods and goddesses whose overthrown images and altars Doctor Loeschke has picked up, where the followers of the crusading bishop cast them down many centuries ago. Some of them had been so far forgotten that the inscription on a single broken

ONE OF TRIER'S MOTHER-GODDESSES, a cornucopia in her arms, and two children leaning on her lap

statue now tells us for the first time that men ever conceived of such divinities or adored them. Such, for example, is the goddess who bears the remarkable name of Icovellauna. Two other hitherto unknown goddesses, Aveta and Ritona, were also honored here. These and other female deities were always pictured in the same general way: as fine young mothers with their children in their arms or leaning on their knees; while they held out to their worshippers baskets or cornucopias full of the fruits of the earth. These were evidently kindly goddesses, who were invoked for good harvests or prosperous trading ventures; and in them men saw also the symbols of their own mothers, of the mothers of their own children, and of the whole general dignity of motherhood.

It might be thought that these goddesses, so like each other in their attributes, were merely the same divinity disguised under different names. But an altar discovered some years ago, at Xanten on the lower Rhine, many miles from Trier, proves that they were separate personalities in the minds of their devotees. The man who erected this monument of piety was a citizen of Trier, secretary to the commander of the Thirtieth Roman Legion, so the inscription states. He dedicated his altar MATRIBUS TREVERIS — "To Mothers of Trier", that is, to all the mother-goddesses of whom his own mother had told him many years before in the fair city on the Moselle.

The gentle goddesses of Trier sometimes had serious businesses, attending to matters that one might think at first would be left to the male members of the pantheon. One of them, named Epona, is always shown riding on a horse; the region around Trier was the Kentucky of the Galo-German holdings of Rome. But the maternal cares of Epona were evidently extended to her four-footed charges, for her steed is often a mare, shown with a colt at its side.

Besides the domestic, horse-tending Epona, there was another goddess who had a favorite animal. This was Artio, the bear-goddess. Then there was the forest goddess Arduinna, deity of the forest of Ardennes, immortalized by Shakespeare as Arden Wood. Arduinna's animal was the hare. These animal-keeping goddesses and their male counterparts, Doctor Loeschke thinks, are surviving relics of an earlier animal worship.

For there were also gods associated with animals in this ancient South German pantheon. One of the most striking statues found in the temple is of a bull, with a broad-shouldered man half-recumbent between its forelegs. The bull is a figure of the water-god; for the power of water to make the land fruitful was figured under the symbol of this animal in many lands and probably dates back to times before history. The man is probably also the deity of water. In the minds of the ancient worshippers at this shrine, *both* figures are images of the *same* god. It is a bit puzzling to modern minds, but that is how they thought of it.

Other sculptured groups show a god in human form hacking his way with an ax through thick forest growth, over which the head of a bull shows, together with three water-birds, probably cranes. This Doctor Loeschke interprets to mean that the

THE LATIN INSCRIPTION on this altar states that the donor was a sailor in the Roman fleet on the Rhine, and a dealer in beer on the side

sun-god — Apollo of the Romans, Grannus of the Gauls and Germans— is clearing away the oppressive primeval forest, and releasing the streams and springs for the use and benefit of mankind.

Another association of human and animal in a sculptured deity was found in what was probably the principal shrine, at least during one period of the temple-group's development. This was a heroic-sized statue of Jupiter mounted on a horse. The animal was represented not merely as galloping on the ground but flying through the air, and this, together with inscriptions addressing Jupiter as "hammer-wielder", shows that the ancient Treverans thought of the chief of the Roman gods as identical with their own Donar, the "thunderer", better known to us, prehaps, by his Norse name of Thor. Our Thursday, or Thor's day, is still known to the Germans as Donnerstag, or Donar's day.

Here again the man and the horse represented the same god. The horse was a holy animal to the ancient Germans, and its flesh was eaten at their great religious feasts. Therefore, after Christianity achieved the ascendency, the eating of horse-meat was forbidden; so that the repugnance which all Nordics have for a dish which the Latins and Gauls are said not to despise, is simply a surviving tabu against the worship of Donar. Nordic Christians refuse to eat horse as the Jews (*Turn to next page*)

Roman Temples—*Continued*

refuse to eat pork, but unlike the Jews they have forgotten the reason why.

A relatively late comer among the gods worshipped in the temple town of Trier, and a complete outsider so far as the group of native gods is concerned, was the Persian deity Mithra, favorite of the Roman legions throughout the empire. Mithraism became widespread wherever there were Roman soldiers about two centuries before the birth of Christ, and for a long time during the decay of the old Roman cults this Oriental religion, which really had much to recommend it, was a serious rival of Christianity.

Mithra, according to the popular belief of two thousand years ago, though of mortal form, was not of mortal birth. He sprang from the living rock in a cave, and his exploits formed a long and involved gospel related only to the initiate. Only fragments of his story have survived, but it is known that his earthly pilgrimage centered around the pursuit and eventual sacrifice of a great bull. Heroic fortitude and self-denial were expected of his imitators, and since women were excluded from his worship he naturally became the favorite god of the Roman legionaries.

One large shrine, or Mithraeum, dedicated to him, has been found in the temple group at Trier. It is unique among the structures excavated by Doctor Loeschke in that it was a part of a dwelling-house. No other domestic structure of any sort has thus far been found in the holy enclosure. And buried in the debris of this house was one of the best-preserved Mithraic sculptures that has ever been uncovered. Its central panel shows the birth of Mithra, and surrounding the young god's likeness are various carved symbols of his later career.

But not even Mithra the powerful could hold his shrine against the rising tide of Christianity. Survivors of bitter persecutions, the Christians could see no good in the gods once favored by the pagan emperors. So as soon as they were strong enough they turned on them and destroyed their shrines and altars and statues in one zealous carnival of wreckage.

In a corner of one of the ruined buildings Doctor Loeschke has found the one Christian sign that has been yielded by all the excavations so far conducted at this place. It is a cross-shaped safety pin or brooch, such as men used for securing their cloaks. Possibly some laborer, working for the image-smashing bishop, tore this off his garment as he was swinging his pickax or straining at his wrecking crowbar. Lying here among the broken and forgotten relics of paganism, this little metal cross is like a seal of the final triumph of Christendom. The Nazarene had conquered.

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Extinct Hornless Rhino

Paleontology

The first rhinoceros had no horn and was the largest land mammal that ever inhabited the earth. Prof. A. A. Borisyak of the Soviet Academy of Science is responsible for these startling statements.

Several years ago Prof. Borisyak found in Turkestan some huge bones of an unknown extinct animal. At present a complete skeleton, said to be the only one in existence, is set up in the Geological Institute at Leningrad. It is now known under the long name of *Indricotherium Asiaticum*. A detailed study of the skeleton, which proved to be remains of a forefather of the modern rhino, yielded much new and valuable information.

The elephant, formerly regarded as the largest land mammal, must give his place of honor to *Indricotherium*. Even now when his mighty frame is reduced to mere bones skilfully strung together, the *Indricotherium* towers nearly 15 feet. The biggest present day elephant would hardly reach his shoulders. No other known land mammal, living or extinct, can range in size with this prehistoric monster.

Perhaps the most peculiar feature of this first rhinoceros is that it lacks the familiar horn. It seems that horns are rather a recent acquisition of the rhino tribe.

Big and strong as *Indricotherium* must have been, he probably had a very mild disposition, according to Prof. Borisyak. Teeth and general construction of the skeleton show that the *Indricotherium Asiaticum* could eat plant food only, preferably tree leaves. His body was slightly like that of the modern giraffe, because of a long neck. Notwithstanding his enormous bulk, the animal must have been very fleet of foot.

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42 Ice Cream Cans

Metrology

When you buy ice cream now, in quantities of a gallon or so, it may come in one of forty-two different kinds of cans. Before long this unnecessary variety may be reduced to five kinds, if the recommendation of the Simplified Practice Committee of the International Association of Ice Cream Manufacturers is adopted.

At the meeting recently of the National Conference on Weights and Measures, Ridgway Kennedy, chairman of the committee, told what was being done in an effort to introduce savings from simplified practice in the ice cream industry.

During the past year, he said, his committee made a survey of the bulk ice cream containers in use throughout the country, and found the forty-two different styles. There were eleven 5-gallon cans of different shape, thirteen 3-gallon cans, ten 2-gallon cans and eight 1-gallon cans.

"As the general use of mechanical refrigerated cabinets throughout the industry has, to a large extent, standardized the use of the 5-gallon cans, we felt it unnecessary to consider the 2 and 3-gallons cans, as most of us are no longer placing orders for these sizes and are merely using those we have until they are worn out and can be discarded," said Mr. Kennedy.

To provide a size between one and five gallons, it was also decided to adopt a 2½-gallon can, two of which would fit into the 5-gallon hole in the refrigerated cabinet.

As the 5-gallon holes in the cabinet are of two different shapes, one tall and the other squat, the committee has adopted two alternative shapes for the five and two-and-a-half gallon cans. These, with the new one-gallon can will adequately serve the purpose of the great variety of older cans.

Mr. Kennedy stated that the smaller quart and pint cartons for home use show almost as much diversity as the larger cans, and that his committee is now working on them with a view to simplification.

Science News-Letter, June 15, 1929

With the establishment of the Grand Teton National Park, Wyoming, and the Bryce Canyon National Park, Utah, during the past year, there are now 21 members of the national park system.

Raynaud's Disease Overcome

Medicine

Medicine appears to hav won another trench in its war against disease with the achievement of the surgical control of Raynaud's disease, just reported by Dr. A. W. Adson and Dr. G. E. Brown of the Mayo Clinic. Raynaud's disease is painful, disabling and distressing to the patient, often ending in amputation of feet or hands. It has been compared to frostbite.

Everyone knows what frostbite is; that the supply of blood to a frostbitten area is interrupted; that if the injury is severe enough the frostbitten tissue is not nourished, dies and becomes gangrenous. Reynaud's disease is not frostbite. It is much more severe and it is not so definitely related to cold. However, the condition it produces looks and feels to the patient who has it something as frostbite looks and feels. Until recently, treatment for Raynaud's disease has been unsatisfactory. "The complete surgical control of Raynaud's disease would seem to be accomplished", Dr. Adson and Dr. Brown have now announced. They say "seem to be" and they use the word "control" rather than "cure". Genuine medical investigators do not claim too much too quickly.

However, building on the foundations laid by other investigators. these two physicians in their attack on Raynaud's disease have directed their attention to the autonomic or sympathetic nervous system. This is the nervous system which works without any thought on our part. It helps to control our digestion, our heart beat and the tension of the walls of our blood vessels.

These scientists founds ways of removing small portions of this nervous system that lie in the back, behind the abdominal organs and in the upper part of the chest. When the right portions are removed, the tightness, or spasticity, of the affected blood vessels is relieved. This relief seems to be permanent, which gives rise to the hope that scientific medicine and surgery have conquered Raynaud's disease.

Science News-Letter, June 15, 1929

Drug Store Lunch O. K.

Pharmacy

The drug store lunch counter is seen to have a scientific justification in the growing union of foods and drugs as medical material with which to treat or ward off disease, said Dr. Wilbur L. Scoville on the occasion of his receiving the Remington Medal of the American Pharmaceutical Association. This medal represents the highest award in the profession of pharmacy, and was bestowed on Dr. Scoville in recognition of his outstanding accomplishments as chairman of the National Formulary Committee.

"The presence of the lunch counter in the drug store, which the old-time pharmacist views with misgivings, may be a real step in advance," declared Dr. Scoville. "The old Materia Medica was a list of mineral substances, vegetables drugs and a few animal bodies which have an influence upon diseased conditions. The new Materia Medica includes not only these but all foods, light, heat and even wind. The function of the last has not yet been made plain, but it will be an interesting study."

The physician now prescribes proper diet, fresh air, and sunshine along with and often in place of pills and powders. Vitamins and minerals are found in foods, together with blood-regenerating properties far beyond those of the old-time tonics. The distinction between foods and drugs is thus becoming less pronounced, Dr. Scoville finds.

The National Formulary is a book of standards for pharmaceutical formulas in use by physicians and pharmacists. It derives its legal standing and official authority by virtue of the Federal Food and Drugs Act. It was originated by the American Pharmaceutical Association over forty years ago and is revised every ten years by a committee chosen by the Association.

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To avoid disputes as to authorship of their paintings, artists in France are having their pictures registered, and filing data sufficient to establish identity of the pictures.

Traces of at least nine fossil forests, one above the other and representing 12,000 years of growth, are exposed in a cross-section of Specimen Ridge in Yellowstone National Park.

X-Rays and Evolution

Biology

Irradiation with X-Rays probably never will be employed to develop favorable mutations and thereby speed up evolution, in the opinion of Dr. Halsey J. Bagg of the Memorial Hospital, New York. Dr. Bagg has expressed this belief in a communication to the New York Academy of Sciences.

He described his experiments in exposing rats and mice to X-rays, showing a variety of deformities which had been produced, including the elimination of one kidney in the first generation and the total absence of kidneys in the second generation after exposure. The rodent offspring with no kidneys lived about one hour after birth.

Dr. Bagg said he has seen no favorable variations as a result of exposure to X-rays and concluded that exposure of the germ plasm in human beings to irradiation should be carefully guarded against.

Dr. Charles Packard of the Crocker Institute of Cancer Research, New York, read a paper describing his experiments to determine whether irradiation affected rapidly growing tissues to a greater extent than normally growing tissues. His experiments dealt with mitosis or cell division process in the early stages of development of fruit-fly eggs.

Batches of approximately 1,000 drosophila eggs each were examined at temperatures of 13 degrees, 23 degrees and 28 degrees Centigrade. At the first temperature mitosis was observed to occur every 50 minutes, at the second every 20 minutes and at the last every 12 minutes. The results of exposure to X-rays in all instances was approximately the same, the variation being not more than 3 per cent., Dr. Packard reported.

When exposed to irradiation for five minutes about 25 per cent. of the eggs died, when exposed for ten minutes about 50 per cent. died, for fifteen minutes about 65 per cent. died, and for twenty minutes about 75 per cent. died. He concluded that the theory that protoplasm is sensitive to irradiation according to the rate at which cell division takes place was not supported by his experiments.

Science News-Letter, June 15, 1929

A new device attached to a front door lock switches off the hall light inside the house when you lock the door, and lights the light when you unlock the door.

Congress Debates Manganese Tariff

Economics—Chemistry

Metallic manganese, vitally important in war time, has provoked a small war of its own on Capitol Hill.

The present tariff of one cent per pound applies to ores containing 30 per cent. or more of manganese. Realizing early in the hearings before the House Ways and Means Committee, that it would be hopeless to attempt to increase this tariff, representatives from states where there are large deposits of low-grade manganese ores are now concentrating their efforts on an attempt to have the present tariff made applicable to low-grade ores containing from 10 to 30 per cent. manganese.

Steel manufacturers have bitterly opposed any such change, and have been tacitly upheld in many of their contentions by facts and figures readily obtainable from government departments.

The story of manganese is all bound up with the World War. At that time manganese ore, badly needed for ordnance and munitions, soared from $12 to $65 per ton.

Hectically stimulated by this price, American producers of manganese in one year raised their production figure from 31,474 tons in 1916 to 129,405 tons in 1917 and by supreme efforts to 305,869 tons in 1918. Yet imports during these two years did not slump a great deal, in fact there was such a demand that American producers simply could not meet the emergency. Much needed shipping, according to Dr. George Otis Smith, director of the U. S. Geological Survey, had to continue to be diverted in order to bring in Brazilian ores.

Nevertheless the efforts of the domestic producers during these two years completely stripped many of the known deposits of high grade manganese ores in this country.

Today, it is estimated by a committee of the American Institute of Mining and Metallurgical Engineers that there are only between 578,510 and 1,223,650 tons of recoverable manganese from the reserves of known ferro-grade deposits in the whole country. This maximum amount given would supply the needs of the United States for not more than a few years at the most.

The Geological Survey backs up this statement and the Bureau of Mines further stated:

"Except for the chemical ores produced in the Philipsburg district of Montana, the supply of high-grade metallurgical manganese ores in the United States is meager."

Even the large domestic production in war years—about half of the past 25 years domestic production—in the face of inflated prices, was conducted at a loss and Congress enacted the war minerals relief act under which the manganese miners' losses were reimbursed by the government to the extent of $2,516,112, the Bureau of Mines pointed out.

Most representatives from states abounding in low-grade manganese ores admit all this, but maintain that the processes for recovering manganese from the low-grade ores could be developed economically if given sufficient encouragement. Representative William Williamson, Republican, of South Dakota, leader in the fight to force low-grade manganese ores to be included under the present tariff provisions, stated that there are 10 to 25 billion tons of the low-grade ore in the country.

He stated that much low-grade ore is being imported at the present time free of duty, and that producers of high-grade pig iron and steel have found a way to use the low-grade ore.

Were the duty applied to low-grade ores, he maintained, the United States would soon be able to produce all the manganese this country needs and provide for any possible future emergency.

Opposing the change is this statement from the American Institute of Mining and Metallurgical Engineers, that, though the domestic resources of low-grade reserves are adequate, "any effective attempt to force their adaptation to the country's needs beyond the normal development which may be looked for through increase in skill and vigorous educational campaign, would result in a cost so enormous as to be quite disproportionate to the purpose to be served."

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Meningitis Becomes Menace

Public Health

Such drastic measures as restriction of immigration from the Philippines in order to check the epidemic of meningitis in the west may not be necessary, Dr. Hugh S. Cumming, Surgeon-General of the U. S. Public Health Service, has stated. The officials of the steamship company bringing immigrants, among whom meningitis developed, from Oriental ports have agreed to all the special regulations suggested by quarantine officers of the Public Health Service.

The most radical of these consists in segregation of ships' passengers according to the port of embarkation. This means that all immigrants boarding the ship at Manila will be kept by themselves, as will those boarding at Chinese, Japanese and Hawaiian ports. The Filipinos, who are extremely susceptible to meningitis, will thus be protected from exposure to the disease through contact with natives of other places where the disease may exist.

Meningitis has been brought into this country through these Filipino immigrants, but health officials are not sure whether the disease was contracted by these immigrants in the Philippines or at various Chinese and Japanese ports where the ships stop on the way to San Francisco and Seattle. No cases of meningitis had been reported in the Philippines before the outbreak on the West Coast of this country. Some meningitis had occurred in Japan, and in China no exact knowledge of health conditions among the natives is available.

The Surgeon-General and other public health officers hope that these new regulations will prove effective in checking the present epidemic.

In California during the outbreak the disease was kept pretty closely within the immigrant Filipino population, because these immigrants were employed on farms where they were under contract and where they could be kept in quarantine by the state health department. However, the condition was so serious that the epidemic was one of the major subjects discussed at the conference of state health officers and the U. S. Public Health Service just held.

Science News-Letter, June 15, 1929

Nicotin Affects Milk Secretion

Pharmacology

Large doses of nicotin suppressed the secretion of milk in the cat and the cow and, in one case, in the human mother, investigations carried out by Dr. Robert A. Hatcher and Hilda Crosby of the Cornell University Medical College have revealed. The experiments were undertaken to discover any effects on either mother or child when the nursing mother smoked.

"Little is known concerning the excretion of nicotin in the milk of lactating women who smoke. Our attention was directed to the problem by the occurrence of symptoms in an infant which were thought to be due possibly to nicotin in the milk of the mother who smoked many cigarettes," the authors stated in their report to the *Journal of Pharmacology and Experimental Therapeutics*.

Smoking mothers have recently come in for considerable censure by members of the clergy and other reformers on the ground that smoking injures both mother and nursling. As a matter-of-fact, no very exact scientific knowledge of the subject is available, except for the recent experiments of Dr. Hatcher and Miss Crosby. Physicians have not found any effect on the child that could be attributed to nicotin poisoning from cigarettes smoked by the mothers. These experiments bear this out. Kittens who nursed from the cat which had received large doses of nicotin were not affected. Dr. Harvey C Williamson, Dr. Howard S. McCandlish and Dr. Ogden Conkey, all of the department of obstetrics and gynecology of Cornell University Medical College, and consequently men of vast experience with mothers and new-born babies, told the investigators verbally that they never had observed any dimunition in the secretion or supply of milk, or any effect on a child that could be attributed to smoking of cigarettes by mothers.

Tobacco is known to affect different people in different ways. Some are extremely susceptible to nicotin. Partly because of this but largely because pregnancy is a precarious condition calling for every precaution, physicians generally advise expectant mothers to refrain from smoking. This is done largely to protect the mother herself from any possible ill effects.

In the experiments of Dr. Hatcher and Miss Crosby, it was found that large doses of nicotin suppressed the secretion of milk in cat and sow for longer periods than those required for the elimination of the greater part of the poison from the body. The human subject of the experiment was a young woman aged 25. She smoked from 20 to 25 cigarettes a day. The secretion of milk had been abundant but decreased rapidly during the last two days of the experiment. A specimen of the milk was then examined and found to contain just a trace of nicotin.

Science News-Letter, June 15, 1929

Dog-Poisoning Toad

Zoology

Toads are stoutly defended by naturalists against the ancient charge that they are "ugly and venomous." And now, just as most folks have about become convinced and converted, comes a scientist from the Southwest with a report of a toad poisonous enough to kill a dog and to make a man sick.

It is M. E. Musgrave of the U. S. Biological Survey who brings the story of the dog-poisoning toad.

He says: "I lifted a large dark green toad out of a standpipe in front of my house. A wire-haired terrier dog standing by jumped at the toad, which swelled up and hissed. The dog then grabbed the toad and killed it. In the meantime a large police dog ran up and just put his nose on the toad. Within two minutes' time the police dog was partially paralyzed, staggering, and falling, unable to control its body and legs. Within three minutes from the time the dog first attacked the toad, the wire-haired terrier was dead, evidently from congested lungs, as she was apparently unable to get air into her lungs from the time I picked her up, which was not more than a minute after she killed the toad. I became very sick myself, having a peculiar lifting feeling in my lung cavities and a swimming feeling in my head. I wanted to keep going, walking, and did so for about thirty minutes and the sickness wore off. The big police dog recovered about an hour after it put its nose on the toad and apparently suffered no after effects."

Science News-Letter, June 15, 1929

Hunt Elephants

Paleontology

An expedition on an almost military scale, to hunt elephants and rhinoceroses in the Arctic northern portion of Siberia was the project advocated before the American Philosophical Society by Prof. I. P. Tolmachoff of the Carnegie Museum of Pittsburgh.

It is not a wild-goose chase that the Pittsburgh scientist projects, but a frozen-elephant hunt. The mammoths and rhinoceroses that once roamed the plains that are now the home of the reindeer have been extinct for anywhere between 10,000 and 50,000 years, but their remains are so perfectly preserved in the perpetually frozen soil of Siberia that not only their bones and teeth but even their skin and flesh can be taken out intact. There is a stuffed mammoth now in a Leningrad museum. About half of the ivory of commerce, Prof. Tolmachoff said, is from Siberian "fossil" tusks, and the supply seems to be inexhaustible.

Because all modern elephants and rhinoceroses are creatures of tropical habitat, we have unconsciously imbibed the notion that these Siberian representatives of the two animal families were warm-climate beasts as well, and were pinched out by the coming of glacial cold. This, Prof. Tolmachoff declared, is quite erroneous. They were Arctic animals, adapted for life in a climate differing little or not at all from the present climate of Siberia, and feeding on the same plants that now support the reindeer. The cause of their extinction is still a mystery, but probably they died from sheer evolutionary over-specialization.

An expedition to make a thorough scientific study of the frozen remains of these great beasts would present many difficulties, Prof. Tolmachoff stated. The party would have to operate under Arctic conditions, thousands of miles from a railroad. But it would be worth while because of the practically untouched fields that lie open, both in the mainland and on the New Siberian Islands. Results of great, and possibly sensational, interest might be expected.

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The bald eagle is so called because the white plumage on its head and neck suggests baldness.

A recent invention is a "talking post-card" which has its greeting on a tiny phonograph record.

Fluorine Unlocks Chemical Secrets

Chemistry

Fluorine, the gaseous chemical element heretofore isolated in only small quantities, has been produced electrolytically in thousand cubic feet quantities by Profs. Wilder D. Bancroft and Newton C. Jones of Cornell.

As a result of a new method of analyzing complex organic compounds will be developed. Determining just how some chemicals are put together has been difficult because dissociation with electric current, a fruitful method for some compounds, can not be used on solutions that do not react to electricity. Fluorine, however, reacts with almost any organic substance, whether electrolytically conducting or not, and it displaces that portion of the substance that would have appeared at the anode pole if the substance had been electrolysed.

These findings and possibilities were reported to the American Electrochemical Society. Profs. Bancroft and Jones also discovered that fluorine when it reacts with benzene does so explosively although this was unexpected in the light of properties of the two gases hitherto known.

Large quantities of fluorine occur in different parts of the earth's crust but it is practically almost tightly locked in combination with other elements. One of the common minerals containing it is fluorspar. In school chemical laboratories, students know one of fluorine's compounds, hydrofluoric acid, because of its property of etching glass.

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Cod Liver Oil for TB

Therapeutics

A chilled beverage of cod liver oil floating on tomato juice was served as an after-meal liqueur to tuberculous patients with the result that intestinal symptoms of the disease were often completely relieved, Dr. M. McConkey of the New York State Hospital for Incipient Tuberculosis told members of the National Tuberculosis Association.

Tuberculosis of the lungs often spreads to the intestines, possibly through swallowing of infected sputum. Dr. McConkey believes absence of sufficient vitamins in the ordinary hospital or sanatorium diet contributes to the development of the intestinal tuberculosis as a complication of the pulmonary disease. The tomato juice-cod liver oil beverage supplied the necessary vitamins. Treatment with either the tomato juice-cod liver oil combination or with generalized ultraviolet radiation was successful.

Experiments with guinea pigs who were fed tuberculosis sputum proved the treatment to be scientifically sound, Dr. McConkey and Dr. David T. Smith of the same institution reported.

"These experiments show that intestinal tuberculosis may be produced in guinea pigs by feeding them sputum containing tubercle bacilli when the diet is partially deficient in vitamins A, C, and D," stated the investigators. "Our most recent experiments suggest that chronic partial deficiency of vitamin C is the most important factor in the production of the experimental disease."

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TB on Decline

Public Health

Four factors responsible for the gratifying decline in the tuberculosis death rate during the last thirty years are the elevated standard of living, improved sanitary control, more adequate hospital facilities, and public health education, stated Dr. Louis I. Dublin, statistician of the Metropolitan Life Insurance Company. Continuation of the public health and social service activities responsible for much of the decline will probably further decrease the tuberculosis death rate to a negligible point, was the encouraging prophecy he put forward.

"I firmly believe," he said, "that by continuing and strengthening the same activities which have been directed against tuberculosis in the past, we can still further reduce the incidence of this disease and ultimately eliminate it from the list of significant causes of death."

The lowest tuberculosis death rate on record was chalked up for the year 1928. The decline since 1900 has been steady and ever-accelerating. Thirty years ago tuberculosis brought death to nearly two and a half times as many persons per 100,000 as now.

"In a single year 140,000 persons will survive who would have died from tuberculosis, had the rates of 1900 prevailed. . . . . There is no indication that this state of affairs will change or that forces beyond the control of men will cause the mortality curve to swing upwards," Dr. Dublin stated.

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Typhoid Declines

Hygiene

The typhoid fever death rate for 81 large cities of the United States continued to show a decline during 1928, a survey just completed by the American Medical Association shows. Of these 81 cities having a population of over 100,000, nine had no typhoid deaths during the year. These were Duluth, Elizabeth, Lowell, Lynn, New Haven, Springfield, Mass., Tacoma, Yonkers, and Youngstown.

Particularly notable was the achievement of Tacoma, which stood at the foot of the list of Mountain and Pacific cities in 1927, and which in 1928 had not only no typhoid deaths but also no diphtheria deaths, a record which none of the other cities has ever had.

Forty-five cities made the honor roll for rates below 2.0 deaths per 100,000. Included in this honor roll were all the cities of over one million population, Chicago, Cleveland, Detroit, Los Angeles, New York City, and Philadelphia. Nashville had the highest death rate of 15 per 100,000.

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Ant "Cowboys" Faithful

Entomology

That ants like humans have cattle is an old story, but the faithfulness with which they attend their little green "cows" has had a new light shed on it by the researches of Dr. Herman Eidmann, of the University of Munich. Charge over a given herd of aphids is not turned over to any chance ant out of a nest, but to certian designated individuals, and these return day after day to the same twig where their particular aphids are feeding. There they watch over them, drive off or kill strange ants, and protect their herds from other natural enemies.

Dr. Eidmann learned that the same ant returns to the same twig full of aphids regularly by the simple trick of putting dabs of colored paint on the ant herdsmen, and corresponding paint spots on the twigs where he first saw them. So faithful were the six-legged cowboys that when the weather became warm enough they frequently remained on the twigs all night. And although the species under observation is one that ordinarily avoids the light, the members of the colony that had the job of aphid-herding assigned to them would patrol their twigs in the full glare of the midday summer sun.

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Races React Differently to Drug

Physiology

If the doctor asks, "What race do you belong to?" it may not be one of those unimportant questions. It might make a difference in the treatment prescribed. That this is the case in epilepsy was reported by Dr. John Notkin and three associates from the New York Post-Graduate Medical School and Hospital, to the American Psychiatric Association.

Italian and Hebrew patients are used to large amounts of salt in their food. When they were given sodium bromide, a sedative, to ward off epileptic convulsions, Dr. Notkin found that special care had to be taken that the bromide did not reduce the salt concentration in their blood too low. Anglo-Saxons who ordinarily eat less salt could stand higher doses of this drug without reducing the salt concentration in their bodies to a hazardous extent.

Bromide has been largely discarded in treating epileptic patients because of its undesirable effects on the body chemistry. The investigations at the Manhattan State Hospital indicate that if the dose is adapted to the patient's nationality and to his individual body chemistry, the undesirable effects can be averted.

"The effect of bromide on the body chemistry is not yet fully understood," Dr. Notkin said. "It seems reasonable to suggest that the antispasmodic influence of the drug is due to the decrease of the irritability of the nerve cell."

Sixty-five cases given the bromide treatment were described by Dr. Notkin, who said that the number of attacks of convulsions was greatly reduced and in many instances epileptics have had no seizures for a year or longer.

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Sex is Factor in Mice Cancer

Pathology

In support of his hope that biological researches, particularly those involving hereditary studies, eventually will help reveal the nature of the causative agent of cancer, Dr. Clarence C. Little, president of the University of Michigan and director of the laboratory of mammalian genetics, has announced that the appearance of cancer has been influenced by surgical transplantations in otherwise immune mice.

"Cancer of the breast is known to be inherited in one of the laboratory strains of these animals," Dr. Little said. "It occurs in more than 90 per cent. of the breeding females which live to be 18 months old. It does not occur in the brothers of these cancerous females. Why is this so?"

To answer the question, Dr. William S. Murray of the laboratory staff made extensive investigations at Dr. Little's suggestion. Some 200 male mice of the particular strain were made "neutral" as regards sex by removing their male glands when they were only a few weeks old. The operated animals remained non-cancerous. Apparently, the absence of male sex glands was not sufficient to induce cancer to develop.

Then taking another group of 200 male mice so "neutralized", he placed under the skin of each the ovary from one of their sisters, which, he pointed out, were cancerous nine times out of ten. The transplanted ovarian tissue persisted and grew under the skin of a number of the operated males. In 37 of these mice cancer of the breast occurred.

Thus, it seems that some ovarian secretion is one of the causative factors in the formation of cancer of the breast in this particular stock of mice. While of only limited significance as a single series of experiments, the research opens a new method of attack upon the problem of cancer, Dr. Little said.

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Young Trees Nod To Sun

Botany

On a bright warm day in early spring, when the young evergreens are sending forth long, slender, candle-like shoots of fresh green, one who looks closely may note that the topmost shoot and that on each of the upper branches bend toward the sun. Like living compasses, as the day advances, they follow the course of the sun from east to west. If the day is sunless and windy the shoots bend into the wind, changing their direction if the wind shifts to a new quarter. On a cloudy day with no strong wind they stand erect.

The reason for this remarkable behavior of the young evergreen shoots is an uneven tension within the rapidly growing stem. On the side that for the moment is more exposed to the sun or wind the tender tissues are losing a disproportionate amount of water, and consequently are shrinking. On the less exposed side the tiny growing cells are swollen with the water constantly fed to them from the tree's roots. Hence the shoot leans in the direction of its drier, less expanded, half, just as a man with a pain in one side leans toward that side.

As the sun swings across the sky, or as the wind shifts, the pucker moves from one set of cells to another, and the shoot bows its head in a new direction and then still another.

The hemlocks and pines, and other evergreens of rapid growth display this oddity more often than slow-growing species with stout heavy leaders, such as the spruces. In the latter, evaporation from the stem is usually retarded by a greater thickness of the bark. In any case, it is only a few weeks before the most rapid growth is over and the bark of the slender, fast-growing tips thickens so that evaporation is greatly reduced. Then the tips assume their common spire-like position, and one must await another spring to see the new shoots again bowing their greeting to sun and wind.

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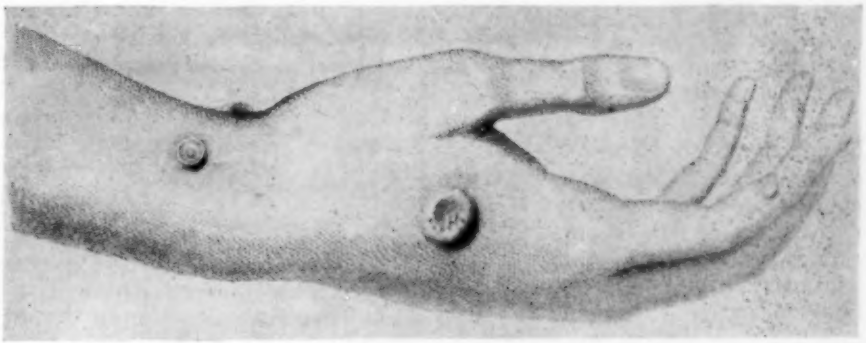
CLASSICS OF SCIENCE: Jenner on Vaccination

Medicine

Vaccination, the first inoculation for the *prevention* of disease, remains almost as mysterious as to its mode of action as it was in 1796. Then small-pox was considered a necessity, and people who had not yet had it were frequently inoculated with the disease so that they might have it at a convenient time and, it was hoped, in a fairly mild form. Now the disease is very rare except in communities where ignorant zeal has overridden the public demand for safety through universal vaccination.

An Inquiry into the Causes and Effects of THE VARIOLÆ VACCINÆ, A Disease discovered in some of the western counties of England, particularly Gloucestershire, and known by the name of THE COW POX. By Edward Jenner, M. D., F. R. S., etc., London: 1798.



COW POX on the hand of Sarah Nelmes. The first vaccination was made from these sores

An Inquiry, etc., etc.

The deviation of Man from the state in which he was originally placed by Nature seems to have proved to him a prolific source of Diseases. From the love of splendour, from the indulgences of luxury, and from his fondness for amusement, he has familiarized himself with a great number of animals, which may not originally have been intended for his associates.

The Wolf, disarmed of ferocity, is now pillowed in the lady's lap. The Cat, the little Tyger of our island, whose natural home is the forest, is equally domesticated and caressed. The Cow, the Hog, the Sheep, and the Horse, are all, for a variety of purposes, brought under his care and dominion.

There is a disease to which the Horse, from his state of domestication, is frequently subject. The Farriers have termed it *the Grease*. It is an inflammation and swelling in the heel, from which issues matter possessing properties of a very peculiar kind, which seems capable of generating a disease in the Human Body (after it has undergone the modification I shall presently speak of), which bears so strong a resemblance to the Small Pox, that I think it highly probable it may be the source of that disease.

In this Dairy Country a great number of Cows are kept, and the office of milking is performed indiscriminately by Men and Maid Servants. One of the former having been appointed to apply dressings to the heels of a Horse affected with *the Grease*, and not paying due attention to cleanliness, incautiously bears his part in milking the Cows, with some particles of the infectious matter adhering to his fingers. When this is the case, it commonly happens that a disease is communicated to the Cows, and from the Cows to the Dairy-Maids, which spreads through the farm until most of the cattle and domestics feel its unpleasant consequences. This disease has obtained the name of the *Cow Pox*. It appears on the nipples of the Cows in the form of irregular pustules. At their first appearance they are commonly of a palish blue, or rather of a colour somewhat approaching to livid, and are surrounded by an inflammation. These pustules, unless a timely remedy be applied, frequently degenerate into phagedenic ulcers, which prove extremely troublesome. The animals become indisposed, and the secretion of milk is much lessened. Inflamed spots now begin to appear on different parts of the hands of the domestics employed in milking, and sometimes on the wrists, which quickly run on to suppuration, first assuming the appearance of the small vesications produced by a burn. Most commonly they appear about the joints of the fingers and at their extremities; but whatever parts are affected, if the situation will admit, these superficial suppurations put on a circular form, with their edges more elevated than their centre, and of a colour distantly approaching to blue. Absorption takes place, and tumours appear in each axilla. The system becomes affected, the pulse is quickened; shiverings, succeeded by heat, general lassitude and pains about the loins and limbs, with vomiting, come on. The head is painful, and the patient is now and then even affected with delirium. These symptoms, varying in their degrees of violence, generally continue from one day to three or four, leaving ulcerated sores about the hands, which, from the sensibility of the parts, are very troublesome, and commonly heal slowly.

Thus the disease makes its progress from the Horse (as I conceive) to the nipple of the Cow, and from the Cow to the Human Subject.

Morbid matter of various kinds, when absorbed into the system, may produce effects in some degree similar; but what renders the Cow Pox virus so extremely singular is, that the person who has been thus affected is for ever after secure from the infection of the Small Pox; neither exposure to the variolous effluvia, nor the insertion of the matter into the skin, producing this distemper.

In support of so extraordinary a fact, I shall lay before my Reader a great number of instances. . . .

Case XVI

Sarah Nelmes, a dairymaid at a Farmer's near this place, was infected with the Cow Pox from her master's cows in May, 1796. She received the infection on a part of the hand which had been previously in a slight degree injured by a scratch from a thorn. A large pustulous sore and the usual symptoms accompanying the disease were produced in consequence. The pustule was so expressive of the true character of the Cow Pox, as it commonly appears upon the hand, that I have given a representation of it in the annexed plate. The two small pustules on the wrists arose also from the application of the virus to some minute abrasions of the cuticle, but the livid tint, if they ever had any, was not conspicuous at the time I saw the patient. The pustule on the fore finger shews the disease in an (*Turn to next page*)

Jenner on Vaccination—*Continued*

earlier stage. It did not actually appear on the hand of this young woman but was taken from that of another, and is annexed for the purpose of representing the malady after it has newly appeared.

Case XVII

The more accurately to observe the progress of the infection, I selected a healthy boy, about eight years old, for the purpose of inoculation for the Cow Pox. The matter was taken from a sore on the hand of a dairymaid, who was infected by her master's cows, and it was inserted, on the 14th of May, 1796, into the arm of the boy by means of two superficial incisions, barely penetrating the cutis, each about half an inch long.

On the seventh day he complained of uneasiness in the axilla, and on the ninth he became a little chilly, lost his appetite, and had a slight head-ach. During the whole of this day he was perceptibly indisposed, and spent the night with some degree of restlessness, but on the day following he was perfectly well. . . .

In order to ascertain whether the boy, after feeling so slight an affection of the system from the Cow Pox virus, was secure from the contagion of the Small Pox, he was inoculated the 1st of July following with variolous matter, immediately taken from a pustule. Several slight punctures and incisions were made on both his arms, and the matter was carefully inserted, but no disease followed. The same appearances were observable on the arms as we commonly see when a patient has had variolous matter applied, after having either the Cow Pox or the Small Pox. Several months afterwards he was again inoculated with variolous matter, but no sensible effect was produced on the constitution. . . .

Case XIX

William Summers, a child of five years and a half old, was inoculated the same day with Baker, with matter taken from the nipples of one of the infected cows, at the farm alluded to in page 32. He becan.e indisposed on the sixth day, vomited once, and felt the usual slight symptoms till the eighth day, when he appeared perfectly well. . . .

Case XX

From William Summers the disease was transferred to William Pead, a boy of eight years old, who was inoculated on March 28th. On the sixth day he complained of pain in the axilla, and on the seventh was affected with the common symptoms of a patient sickening with the Small Pox from inoculation, which did not terminate 'till the third day after the seizure. So perfect was the similarity to the variolous fever that I was induced to examine the skin, conceiving there might have been some eruptions, but none appeared. . . .

Case XXI

April 5th. Several children and adults were inoculated from the arm of William Pead. . . .

Hannah Excell, an healthy girl of seven years old, and one of the patients above mentioned, received the infection from the insertion of the virus under the cuticle of the arm in three distinct points. The pustules which arose in consequence, so much resembled, on the ninth day, those appearing from the insertion of variolous matter, that an experienced Inoculator would scarcely have discovered a shade of difference at that period. Experience now tells me that almost the only variation which follows consists in the pustulous fluids remaining limpid nearly to the time of its total disappearance; and not, as in the direct Small Pox, becoming purulent.

Case XXII

From the arm of this girl matter was taken and inserted April 12th into the arms of John Marklove, one year and a half old,

Robert F. Jenner, eleven months old,

Mary Pead, five years old, and

Mary James, six years old.

Among these Robert F. Jenner did not receive the infection. The arms of the other three inflamed properly, and began to affect the system in the usual manner . . .

Case XXIII

From this child's arm matter was taken and transferred to that of J. Barge, a boy of seven years old. He sickened on the eighth day, went through the disease with the usual slight symptoms, and without any inflammation on the arm beyond the common efflorescence surrounding the pustule, an appearance so often seen in inoculated Small Pox.

After the many fruitless attempts to give the Small Pox to those who had the Cow Pox, it did not appear necessary, nor was it convenient to me to inoculate the whole of those who had been the subjects of these late trials; yet I thought it right to see the effects of variolous matter on some of them, particularly William Summers, the first of these patients who had been infected with matter taken from the cow. He was therefore inoculated with variolous matter from a fresh pustule; but, as in the preceding Cases, the system did not feel the effects in the smallest degree. I had an opportunity also of having this boy (Barge) and William Pead inoculated by my Nephew, Mr. Henry Jenner, whose report to me is as follows: "I have inoculated Pead and Barge, two of the boys whom you lately infected with the Cow Pox. On the second day the incisions were inflamed, and there was a pale inflammatory stain around them. On the third day these appearances were still increasing and their arms itched considerably. On the fourth day the inflammation was evidently subsiding, and on the sixth it was scarcely perceptible. No symptom of indisposition followed."

To convince myself that the variolous matter made use of was in a perfect state, I at the same time inoculated a patient with some of it who had never gone through the Cow Pox, and it produced the Small Pox in the usual regular manner.

These experiments afforded me much satisfaction, they proved that the matter in passing from one human subject to another, through five gradations, lost nothing of its original properties, J. Barge being the fifth who received the infection successively from William Summers, the boy to whom it was communicated from the cow. . .

Edward Jenner (1749-1823) might have distinguished himself in the field of natural history had he been of a more adventurous disposition. He went to London at the age of 20 to study with John Hunter, and arranged for Sir Joseph Banks the scientific specimens brought back from Captain Cook's first voyage. Jenner was asked to go on Cook's second voyage as the naturalist of the expedition, but homesickness for Gloucestershire seems to have caused him to return to his brother's home instead. Here he practiced his profession of medicine, although he did not receive his M.D. from St. Andrews until he was 43 years of age. His early scientific training is very apparent in the carefully controlled experiments by which he proved the truth of the country belief that those who had had the slight inconvenience of cowpox could not take the deadly smallpox. Jenner was 47 when he performed these historic experiments. The rest of his life was filled with the worries and honors attendant upon his great discovery.

Ancient Man Reported from Florida

Anthropology

The discovery of a stone arrow or spear point lying directly under the bones of a mastodon has been made at Melbourne, Florida, by C. P. Singleton, working for Harvard University and has just been announced. This evidence strengthens the much debated theory that there were human beings in America thousands of years ago when mastodons and mammoths inhabited the country.

Dr. J. W. Gidley, of the Smithsonian Institution, who has made previous finds of stone weapons in association with prehistoric animals at the same site, also announces an important discovery consisting of a large stone tool. Some scientists who doubt that man inhabited this country more than four or five thousand years have suggested that the Indian weapons found with the fossil animal bones could have slipped into deeper, older layers of earth than the surface layer of their own age. The large tool, of the type known as a turtle-back scraper, would not be likely to have worked its way into a deeper level, Dr. Gidley points out. Dr. Gidley found it four feet from the surface and two feet beneath the upper layer of the ancient formation in which the fossil bones lie buried. He stresses the point that the conditions are such that the tool could not have belonged to a higher level.

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Radio Time Signal

Astronomy

Amateur star-gazers will be aided by a new time signal being broadcast from the U. S. Naval Observatory here through the Naval Radio Station NAA at Arlington.

Begun on June 1, according to Capt. Charles S. Freeman, superintendent of the observatory, a set of signals is now being sent out at 3:00 a. m., Eastern Standard Time, on a frequency of 113 kilocycles or 2650 meters.

For about a year, said Capt. Freeman, the observatory has been sending out signals at this time, from NAA, on a frequency of 8030 kilocycles or 37.34 meters, and from NSS at Annapolis, on 17.8 kilocycles, or 17,040 meters. These signals are chiefly for the benefit of the Pacific Coast and the Hawaiian Islands, as well as ships in the Pacific. With the frequencies used, however, it has been difficult to receive them with simple apparatus east of the Mississippi.

As many amateur astronomers, lacking accurate clocks, depend on the signals for their time, it was sometimes difficult to carry the time over from the 10:00 p. m. signal to noon the following day, the next signal that could be easily received. By having a signal in the early morning hours, the astronomer can check his watch at the beginning of his observations, and again at the end, thus assuring accurate timing of the celestial events that he observes.

Science News-Letter, June 15, 1929

Cold water is more effective than cold air as a means of cooling milk.

Doctors Not Infallible

Medicine

The failure of the radium-poisoned watch-factory workers to die within the time limit set by the physicians who examined them last year need not occasion surprise. Physicians cannot always be correct in their predictions as to the course of an illness. While experience gives a good guide as to what may be expected of a certain disease, the individual resistance varies with every patient and is a factor difficult to measure. Particularly is this true in a condition like radium poisoning which has occurred very infrequently and in which the physician has scarcely any past experience to guide him in his forecast of the probable outcome.

Patients sometimes die unexpectedly and frequently they live longer than their physician expects them to. The late Sir William Osler, when professor of medicine at Johns Hopkins University some thirty years ago, examined a man suffering from a very grave form of heart disease. Sir William predicted that the man would die within six months. But he is still alive and still coming to the medical school every year for the new students to examine and study as an example of that particular form of heart disease. Even the best and most experienced physicians may be mistaken, may underestimate the resistance of a patient to a disease.

Science News-Letter, June 15, 1929

The U. S. Department of Agriculture is to make talking movies to demonstrate good and bad farming methods.

Nature Ramblings

By Frank Thone

Wild Rose

The radio brings us McDowell's "To a Wild Rose" several times a week now, and it is not hard to shut one's eyes and under the influence of that strange, half-formless, romantic music see a straggling natural hedge of wild roses climbing a hill among the stones of a half-ruined wall. The wild rose is an orphan flower, a Cinderella rejected by jealous gardeners intent upon their highly wrought court beauties; but there are those among us who are quite willing to play the part of the Prince who had a mind of his own and who knew natural beauty when he saw it. The wild rose will always have her friends and champions.

There is no land in the northern hemisphere that is not blessed with wild roses of one kind or another, for there are many species. Even a neighborhood that can be covered in the course of an afternoon's walk will easily afford five or six different kinds. One American wild rose species at least, the Cherokee rose, has achieved the honors of the garden and is the state flower of Georgia, but the rest must be sought in their native places in the country.

The wild rose has not been without honor even in its own fatherland, however, for the prairie states have not been behind the South in gallantry to this beautiful native flower. Iowa and South Dakota have both chosen wild roses as their state flowers.

It may be that some day we shall be willing to devote to American wild roses a little of the attention we now give exotic species from the Orient. But if we do, it is to be hoped that the craze for getting double flowers will not prevail against it, for native roses are really more lovely in their natural, golden-hearted state.

Science News-Letter, June 15, 1929

Hundreds of Motion-Picture Inventors

Inventions

"The motion picture is the product of the labors of hundreds of men for two centuries."

This is the statement of Dr. Henry Leffmann, of Philadelphia, in an article in the *Journal of the Franklin Institute.*

Dr. Leffmann especially protests against claims for Edward James Muggeridge, generally known in the history of invention as Eadweard Muybridge, as being the principal inventor to whom credit for the motion picture is due.

"There can be no question of Muybridge's service in applications of photography to the study of the motion of living beings," he says. "His pictures startled artists, physiologists, athletes and many others, for they showed that the conventional representations of motion such as a horse running, a man walking or an athlete vaulting, were composites on the brain of the observer, due to the persistence of vision, one image on the retina not being discharged before another is produced.

"On careful examination of the history of efforts at projection of pictures on a screen so as to give the illusion of motion—for that is all that has yet been accomplished in the 'movie'—the work of Coleman Sellers and Henry Heyl in mid-Victorian years, set forth fully in the literature of this subject, is seen to be more closely connected with the line of development than was that of Muybridge. The important point of difference is that Muybridge devised and carried out with great ingenuity and success the analysis of motion, but the present-day screen play is a synthesis. Muybridge used in his pioneer work a battery of twenty-four cameras so arranged that each was released in rapid succession, thus recording the motion of a living animal in twenty-four phases at very short intervals, but each was an independent picture from a separate point of view, while the series to be commercially applicable must be made, as in the modern work, from one camera, that is from one point of view."

The cameras used by Sellers and Heyl operated intermittently and with considerable intervals between exposures, Dr. Leffmann points out. This was due to the poorly sensitive photographic material. They were handicapped also by the necessity of using stiff glass plates, but even so their results were apparently quite satisfactory. The modern dry emulsion, largely the work of Doctor Maddox of England, and the flexible film, in a considerable degree due to George Eastman, have permitted the modern motion picture camera to speed up and give the results that are now presented on the theater screens.

"In summing up this study of motion-picture history," Dr. Leffmann concludes, "it surely appears that, as said above, no exclusive claim can be made for any one, nor is such claim necessary. As Schley said at Santiago, 'There is glory enough for all.' A long line of workers, only a few of whom sought or secured pecuniary reward, constitutes the group from Schulze down through two centuries that must be honored for their labors. Muybridge is entitled to conspicuous recognition in this series, but in any summary of motion-picture history the work of Coleman Sellers and Henry Heyl must be prominently set forth. There is no justification for declaring Eadweard Muybridge to be the 'inventor' of motion pictures."

Science News-Letter, June 15, 1929

Caution in Bathing Urged

Hygiene

Bathe, not less offen, but more cautiously and wisely, is the substance of a warning sounded by Dr. Guy Hinsdale, of Hot Springs, Va., who classifies sixteen different kinds of accidents that may occur during bathing, in a report to the American Medical Association.

"One can take too much of a good thing," stated Dr. Hinsdale. "There is a type of patient who reckons that if much is good more is better. It is sometimes hard to restrain such persons from overdoing the bath."

This type of patient is apt to overdo the curative bath as part of treatment at health resorts.

People who are prone to dizzy spells or fainting epileptic seizures, or who have heart trouble need to be especially careful, for temporary loss of consciousness while alone in the bath may result in drowning. However, healthy persons have also met with numerous accidents, some of them fatal, in the course of baths, showers, or seaside swimming.

Scalding while in the tub or under the shower is one of the avoidable bath accidents Dr. Hinsdale discussed. Another that has occurred frequently of late is electrical shock from touching electric appliances, fixtures, sockets or the like when in the bath or while the skin is wet. When the surface of the body is wet it offers much less resistance to the current than when it is dry, water being a good conductor of electricity.

Foolhardiness when swimming, bathing too soon after eating, particularly if the water is very hot or the person is weak or ill, cold plunges and winter bathing in icy northern waters are among the dangerous practices which Dr. Hinsdale warned against. Falls are a prominent type of bathing accident. Death from escaping gas in the bathroom is less frequent than formerly, Dr. Hinsdale reported.

Science News-Letter, June 15, 1929

Quantum Theory Supported

Physics

By observing the way electrons, the particles of which material atoms are made, are scattered by molecules of gas through which they are shot, Dr. Gaylor P. Harnwell, National Research fellow in physics at Princeton University, has furnished new evidence in support of the quantum theory. He reported his work to the American Philosophical Society.

Previous experiments with rapidly moving particles of this kind from radium, as they passed through a gas showed that they were scattered according to a law compatible with the older physical theories. Dr. Harnwell used four gases, hydrogen, helium, neon and nitrogen, and a beam of electrons moving more slowly than those from radium. The way they scattered bore no resemblance to that expected according to the older law, he said, but was quite in accord with the new quantum theory. This theory states that light and similar forms of radiation travel in separate bundles, rather than as trains of waves.

Science News-Letter, June 15, 1929

FIRST GLANCES AT NEW BOOKS

PROCEEDINGS OF THE SECOND INTERNATIONAL CONFERENCE ON BITUMINOUS COAL—2 vols—*Carnegie Institute of Technology,* Pittsburgh, Pa. ($15). The Second International Conference on Bituminous Coal of 1928 surpassed the unprecedented success of the First Conference of two years before in the number of distinguished speakers and the importance of the papers. In the 2000 pages of these two volumes are to be found the most recent and reliable reports of all phases of the coal industry as seen by leading scientists and industrialists in this field from Germany, France, England, United States and other countries. Besides, over a hundred papers and addresses are included the discussions by the experts present. Among the vital topics considered are: pulverized coal, synthetic petroleum, rubber and alcohol, low-temperature carbonization, Claude's engine for getting power from tropical seawater, the utilization of lignite, the fixation of nitrogen, coal washing by flotation, automotive fuels, the liquefaction of coal, water power versus coal power, the fertilizer industry and coal-tar chemicals. Any producer or user of coal or power on a large scale would find this book of practical value.

Engineering
Science News-Letter, June 15, 1929

POLAR MOLECULES—P. Debye—*Chemical Catalog Company* ($3.50). The first and only book giving a complete account of the new and rapidly developing theory of polar molecules written by Professor Debye of the University of Leipzig. The Debye equation announced in 1912 was one of the most important contributions to what is now called "The Third Law of Thermodynamics" and the quantum theory in its most modern form has extended its scope.

Physics
Science News-Letter, June 15, 1929

PEEPS AT MEN OF THE OLD STONE AGE—James Baikie—*Black Co., London* ($1). A simply written account of the world in which our primitive ancestors lived. The story progresses from the Ape-man of Java past the first Englishman, the horse hunters of Solutre, and various other types, ending with the dawn of the New Stone Age.

Anthropology
Science News-Letter, June 15, 1929

THE BRITISH IN TROPICAL AFRICA—I. L. Evans—*Cambridge University Press* ($4.50). The British dependencies in Africa are more than fifty times the size of England. This empire is populated by forty billion natives while the white population is no greater than that of Cambridge, England. How Great Britain achieved such sway in the dark continent is told in this volume by a British historian.

History
Science News-Letter, June 15, 1929

THE COWBIRDS. A STUDY IN THE BIOLOGY OF SOCIAL PARASITISM—Herbert Friedmann — *Charles C. Thomas* ($6.). Several years of intensive observation and research in both North and South America have gone into the making of this book on cowbirds. The presentation of facts about bird parasitism clears up a previously most fertile field of misinformation.

Ornithology
Science News-Letter, June 15, 1929

AMERICAN ROCK GARDENS—Stephen F. Hamblin—*Orange Judd Publishing*—($1.25). Making things grow among one's own rocks is an increasingly popular variation of American gardening. Suggestions and directions are contained in this small book written for the amateur.

Horticulture
Science News-Letter, June 15, 1929

NEW YORK STATE MUSEUM HANDBOOK 7—Aretas A. Saunders—*University of the State of New York* (50c). Anyone will appreciate the accuracy and complexity of avian music after reading this comprehensive summary of bird song.

Ornithology
Science News-Letter, June 15, 1929

STUDIES IN TROPICAL WASPS—THEIR HOSTS AND ASSOCIATES—Francis X. Williams — *Hawaiian Sugar Planters' Association* ($2). A technical treatise on an important group of tropical insects.

Entomology
Science News-Letter, June 15, 1929

THE HOME GARDEN HANDBOOKS—F. F. Rockwell — *Macmillan* ($1). No home is really complete without a lawn and the essentials of good grass in front or back yard are explained in this handbook.

Horticulture
Science News-Letter, June 15, 1929

FISHES OF THE CHESAPEAKE BAY—Samuel F. Hildebrand and William C. Schroeder—*Department of Commerce* ($1.50). Chesapeake Bay is one of the important fishing grounds of the Atlantic coast and government fish authorities have prepared this systematic catalog of its fish as the result of years of study.

Ichthyology
Science News-Letter, June 15, 1929

GRAIN THROUGH THE AGES—Grace T. Hallock and Thomas D. Wood, M. C. — *Quaker Oats Company* (free). This educational pamphlet of the large breakfast food manufacturer in spite of its over emphasis on oats, will prove interesting and instructive to school children to whom it will be distributed.

Botany
Science News-Letter, June 15, 1929

LIFE HISTORIES OF NORTH AMERICAN SHORE BIRDS—Arthur Cleveland Bent — *Smithsonian Institution* ($1). Whither the birds of the seashore are going and whence they come is detailed in this authoritative treatise. There is much more known about some birds than about some people.

Ornithology
Science News-Letter, June 15, 1929

FROM THE GREEKS TO DARWIN—Henry Fairfield Osborn — *Scribners* ($2.50). This history of evolution is a classic. Dr. Osborn has re-studied the twenty-four century period of evolutionary progress that culminated in Darwin.

Evolution
Science News-Letter, June 15, 1929

THE ARCTIC RESCUE—Einar Lundborg—*Viking Press* ($3). How Nobile was saved as told by the pilot of the Swedish rescue expedition.

Aviation
Science News-Letter, June 15, 1929

FAMOUS DIAMONDS—Oliver C. Farrington—*Field Museum* (25c). The history and legends of more than a score of the greatest diamonds, as related in this booklet, make more interesting reading than most fiction. Rulers and nations strove for the possession of these gems, and in most cases records of their changing fortunes is complete.

Mineralogy
Science News-Letter, June 15, 1929

The Menace of Rabies

Hygiene

WILLIAM H. PARK, M. D. and ANNA W. WILLIAMS, M. D., in *Who's Who Among the Microbes* (Century):

. . . The next filterable virus found is the one causing a disease which might be said to be spread chiefly through the sentimentality of people. This is that much-discussed but little understood disease called rabies or hydrophobia.

The dog is the animal in which this virus is most commonly found. Though other animals are susceptible to it, the dog is the practical carrier. We have long made this cry our slogan for the prevention of rabies, "No stray dogs, no rabies," but we still have stray dogs even in the most civilized countries, and we still have rabies.

Indeed, some of the wealthiest (unfortunately, wealth does not always mean intelligence) communities seem to have the most sentimentalists, who believe that nothing should interfere with the liberty—should say liberties—of that noble friend of man, the dog. This would be more reasonable if there were not so many dogs throughout the land that run at their own sweet will, and if they happen to have been bitten by a rabid animal, they in turn may bite man, dogs or other animals.

Many people say: "Why all this hue and cry about rabies?" We have seen a number of persons bitten by dogs, even by dogs said to be mad, and these persons, though they had no treatment, did not come down with rabies. We answer: "It is true that cases of human rabies rather seldom occur after the bite of a dog." This is due chiefly to two reasons:

First, only a small percentage of biting dogs are mad; though in the last two years this percentage has increased materially. Thus, about one-half of the 942 dead dogs sent to our Health Department laboratories during 1927 for diagnosis gave evidence of having died of rabies. Two years ago only 85 of the 360 dogs sent to us had died of rabies—a 100 per cent. increase of the proportion of dogs mad, and 500 per cent. of the actual number of mad dogs sent to us for diagnosis. Of course, there are many non-suspected biting dogs that do not reach our laboratories, so the total percentage of rabid dogs among biting dogs still remains small.

The second reason why we see so few human rabies cases after a dog bite is that human beings are not very susceptible to rabies, and so only a comparatively few come down with the disease after a mad-dog bite, even if they take no treatment. It is estimated that on an average only about 10 per cent. of humans bitten by mad dogs and untreated develop rabies. This is not a very great risk to incur. Of course, this is only an average percentage. Those people develop the disease more readily who are bitten on parts near the brain—that is, about the head—especially the face, and on other parts well supplied with nerves, such as the tips of the fingers. On the other hand, we know that people who take the Pasteur preventive vaccine immediately after having been bitten by a mad dog run on the average only a 0.1 per cent. risk of developing the disease. In other words, if you don't take the specific treatment you run 100 times a greater chance of having rabies than if you do. It's up to you to choose. Most people choose to take the treatment.

For, once a case begins to show symptoms, we see a sight that we may never forget. The convulsed victims present a terrible appearance. At this stage there is no known cure for the disease. The same fatal outcome occurs in dogs, so that those who truly love mankind and dogs and are informed are eager to stop the disease.

The virus was shown by Remlenger, in 1903, to pass readily through the finest filters. The virus from the salivary glands is more filterable than that from the brain.

The virus, after it enters a wound, passes up the nerves and multiplies exceedingly in the central nervous system. It also develops in the large nerve cells of the salivary glands. It may be demonstrated in the sputum of infected animals before any symptoms of rabies appear.

As soon as the virus reaches the brain peculiar bodies appear in the large nerve cells. These cell inclusions are commonly called "Negri bodies," after the one who first published their discovery. One of the authors discovered these bodies at the same time independently and with Lowden made extensive studies of their nature. The conclusion was reached that these bodies are one form of the specific cause of rabies, and Williams gave them a scientific name which is long enough to forget. The practical point about these bodies is that they are diagnostic of rabies. We have developed a quick method of demonstrating them which is now used in all the laboratories of the world. These bodies only show well by this method if the brain is fresh; therefore, an animal suspected of having died of rabies must be taken to the laboratory immediately if the best results are to be obtained.

All of the anxiety due to the fear of rabies, and all of the discomfort and inconvenience in taking the many injections of the otherwise wonderful Pasteur vaccine treatment, may be avoided by the simple and rational expedient of having no stray dogs. Cats are usually not dangerous, because while they are very susceptible to rabies they nearly always have what is called dumb rabies; that is, they become gradually paralyzed and die without biting anyone. So, while we should be on our guard against the occasional cat that may develop the furious form of rabies, our slogan, which we reiterate, "No stray dogs, no rabies," is true in practice.

The recent increase in rabies in New York City and in many parts of the United States is due chiefly to the fact that people have been too sentimental or too careless to check the wanderings at large of their canine friends. They don't seem to realize that they confer a benefit on all dogs, as well as on people, by keeping their own dogs under control.

Science News-Letter, June 15, 1929

Relief funds sent by America following the Japanese earthquake of 1923 provided a surplus so large that two memorial hospitals have been built.

A monument at Pennsylvania State College, known as the Polylith, contains every known variety of building stone to be found in Pennsylvania.

Recent tests of the amount of energy expended in different occupations showed that washing clothes required more energy than any other household task.